

K.T.S.P.MANDAL'S
SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA
RAJGURUNAGAR

SYLLABUS COMPLETION REPORT 2023-2024

DEPARTMENT OF MICROBIOLOGY

SEMESTER I

F.Y.B.Sc.

Subject –Introduction To Microbial World

Teacher Name –Prof.K.D.Gokule

Month	Unit	Topics
July - August 2023	1	<p>Amazing world of Microbiology Development of microbiology as a discipline -Discovery of microscope and Microorganisms (Anton von Leeuwenhoek and Robert Hooke), Abiogenesis v/s biogenesis (Aristotle's notion about spontaneous generation, Francesco Redi's experiment, Louis Pasteur's & Tyndall's experiments) Golden Era of Microbiology Contributions of - Louis Pasteur (Fermentation, Rabies, Pasteurization and Cholera vaccine-fowl cholera experiment) Robert Koch (Koch's Postulates, Germ theory of disease, Tuberculosis and Cholera-isolation and staining techniques of causative agent) Ferdinand Cohn (Endospore discovery), Discovery of viruses (TMV and Bacteriophages), River's Postulates Contribution of Joseph Lister (antiseptic surgery), Paul Ehrlich (Chemotherapy), Elie Metchnikoff (Phagocytosis), Edward Jenner (Vaccination) and Alexander Fleming (Penicillin) in establishment of fields of medical microbiology and immunology, Discovery of Streptomycin by Waksman Contribution of Martinus W. Beijerinck (Enrichment culture technique, Rhizobium), Sergei N. Winogradsky (Nitrogen fixation and Chemo-lithotrophy) in the development of the field of soil microbiology Modern Era of MicrobiologyCarlWoese classification based on 16S rRNA Signification and Application of Human Microbiome, Nano-biotechnology and Space Microbiology Nobel laureates in Life Sciences of 21st Century</p>

August – September 2023	2	Types of Microorganism and their differentiating characters -- Prokaryotes, Eukaryotes, three domain and five domain system of classification --Bacteria (Eubacteria and Archaeobacteria) --Protozoa --Fungi --Algae
September – October 2023		--Viruses, Viroids and Prions --Actinomycetes Beneficial and Harmful effects of microorganisms: Medical Microbiology (Enlist diseases caused by various microorganisms, vaccines and antibiotics) Environmental Microbiology (Eutrophication, red tide, Sewage treatment, bioremediation) Food and Dairy Microbiology (Food spoilage, food borne diseases, Probiotics and fermented food) Agriculture Microbiology (Plant diseases and Biofertilizers and Bio-control agents) Industrial Microbiology (Production of antibiotics, enzymes, solvents and contaminants-bacteria and phages) Immunology (Normal flora, Three lines of defence)
October 2023		Revision And Assignment

As per above syllabus completed theory First Semester. We have completed theory successfully.

Prof. K.A.Bendale

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SYLLABUS COMPLETION REPORT 2023-2024

DEPARTMENT OF MICROBIOLOGY

SEMESTER I

F.Y.B.Sc.

Subject –Basic Technique In Microbiology (Paper II)

Teacher Name –Prof. A.A.Indais

Month	Unit	Topics
July - August 2023	1	I. Units of measurement – Introduction to Modern SI units Microscopy: 1. Bright field microscopy: <ul style="list-style-type: none">• Electromagnetic spectrum of light• Structure, working of and ray diagram of a compound light microscope; concepts of magnification, numerical aperture and resolving power.• Types, ray diagram and functions of – condensers (Abbe and cardioid) eyepieces and objectives• Concept of aberrations in lenses - spherical, chromatic, comma and astigmatism 2. Principle, working and ray diagram of <ul style="list-style-type: none">i. Phase contrast microscopeii. Fluorescence Microscopyiii. Electron Microscopy – TEM, SEM

August – September 2023	2	II. Staining Techniques: <ul style="list-style-type: none"> • Definition of Stain; Types of stains (Basic and Acidic), Properties and role of Fixatives, Mordants, Decolourisers and Accentuators • Monochrome staining and Negative (Relief) staining • Differential staining - Gram staining and Acid-fast staining • Special staining- Capsule, Cell wall, Spore, Flagella, Lipid granules, metachromatic granules
September – October 2023	3	Sterilization and Disinfection <ol style="list-style-type: none"> 1. Sterilization <ul style="list-style-type: none"> • Physical Agents - Heat, Radiation, Filtration • Checking of efficiency of sterilization (Dry and Moist) – Biological and Chemical Indicators 2. Disinfection: <ul style="list-style-type: none"> • Chemical agents and their mode of action - Aldehydes, Halogens, Quaternary ammonium compounds, Phenol and phenolic compounds, • Heavy metals, Alcohol, Dyes, Detergents and Ethylene oxide. • Characteristics of an ideal disinfectant • Checking of efficiency of disinfectant - Phenol Coefficient (Rideal–Walker method)
October 2023		Revision And Assignment

As per above syllabus completed theory First Semester. We have completed theory successfully.

Prof. A. A. Indais

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SYLLABUS COMPLETION REPORT
A.Y. 2023-2024
SEMESTER II
F.Y.B.Sc.

Subject –MB 121: Bacterial Cell and Biochemistry

Teacher Name – Prof. P.P.Tilekar

Month	Unit	Topics
January 2024	1	1. Bacterial Cytology Microbial cell size, shape and arrangements 2. Structure, chemical composition and functions of the following components in bacterial cell: a. Cell wall (Gram positive, Gram negative) b. Concept of Mycoplasma, Spheroplast, protoplast, L-form c. Cell membrane d. Endospore (spore formation and stages of sporulation) e. Capsule f. Flagella g. Fimbriae and Pili h. Ribosomes i. Chromosomal & extra-chromosomal material j. Cell inclusions (Gas vesicles, carboxysomes, PHB granules, metachromatic granules, glycogen bodies, starch granules, magnetosomes, sulfur granules, chlorosomes)

Febraury 2024	2	<p>3. Chemical Basis of Microbiology</p> <p>a. Atom, Biomolecules, types of bonds (covalent, co-ordinate bond, non-covalent) and linkages (ester, phosphodiester, peptide, glycosidic)</p> <p>b. Chemistry of Biomolecules: Structure, organization and functions</p> <p>4. Carbohydrates: Definition, classification</p> <p>a. Monosaccharides: Classification based on aldehyde and ketone groups; structure of Ribose, Deoxyribose, Glucose, Galactose and Fructose.</p> <p>b. Disaccharides: Glyosidic bond, structure of lactose and sucrose.</p> <p>c. Polysaccharides: Structure and types</p> <p>Examples-Starch, glycogen, Peptidoglycan, chitin</p>
March 2024	3	<p>5. Lipids: Definition, classification</p> <p>a. Simple lipids – Triglycerides, Fats and oils, waxes.</p> <p>b. Compound lipids – Phospholipid, Glycolipids</p> <p>c. Derived lipids – Steroids, Cholesterol</p> <p>6. Proteins: Definition, classification</p> <p>a. General structure of amino acids, peptide bond.</p> <p>b. Types of amino acids based on R group</p> <p>c. Structural levels of proteins: primary, secondary, tertiary and quaternary</p> <p>d. Study of Hemoglobin, flagellin and cytoskeletal proteins</p> <p>7. Nucleic acids: Definition, classification</p> <p>a. DNA – structure and composition</p> <p>b. RNA – Types (m-RNA, t-RNA, r-RNA), structure and functions.</p>

		8. Classification of Bacteria: Introduction to Bergey's Manual of Determinative and Systemic Bacteriology 9. Classification of Viruses: ICTV nomenclature
March 2024	4	Revision And Assignment

Prof. P.P.Tilekar

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SYLLABUS COMPLETION REPORT

A.Y. 2023-2024

SEMESTER II

F.Y.B.Sc.

Subject – MB 122: Microbial cultivation and growth

Teacher Name – Prof. K.D.Mandge

Month	Unit	Topics
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January 2024	1	<p>1. Cultivation of Microorganisms:</p> <p>a. Nutritional requirements and nutritional classification.</p> <p>b. Design and preparation of media: Common ingredients of media and types of media.</p> <p>c. Methods for cultivating photosynthetic, extremophilic and chemo-lithotrophic bacteria, anaerobic bacteria, algae, fungi, actinomycetes and viruses.</p> <p>d. Concept of Enrichment, Pure Culture, Isolation of culture by streak plate, pour plate, spread plate.</p> <p>e. Maintenance of bacterial and fungal cultures using different techniques.</p> <p>f. Culture collection centres and their role.</p> <p>g. Requirements and guidelines of National Biodiversity Authority for culture collection centres.</p>
Febraury 2024	2	<p>2. Bacterial growth:</p> <p>a. Kinetics of bacterial growth (Exponential growth model)</p> <p>b. Growth curve and Generation time</p> <p>c. Diauxic growth</p> <p>d. Measurement of bacterial growth- Methods of enumeration:</p> <p>e. Microscopic methods (Direct microscopic count, counting cells using improved Neubauer, Petroff-Hausser's chamber)</p> <p>f. Plate counts (Total viable count)</p>

<p>March 2024</p>	<p>3</p>	<p>g. Turbidometric methods (including Nephelometry) h. Estimation of biomass (Dry mass, Packed cell volume) i. Chemical methods (Cell carbon and nitrogen estimation) j. Factors affecting bacterial growth [pH, Temperature, Solute Concentration (Salt and Sugar)] and Heavy metals</p>
<p>March 2024</p>	<p>4</p>	<p>Revision And Assignment</p>

Prof. K.D.Mandge